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THE ORIGIN OF HIPPOCRATIC THEORY IN SOME OF THE SCIENCE OF THE NATURE PHILOSOPHERS

By JONATHAN WRIGHT, M.D.

PERHAPS one of the first questions the student of history asks, when he comes to grasp the magnitude of the phenomenon of ancient Greece in the evolution of civilization is: When the Greeks met the Persians and the Egyptians in the eighth and seventh centuries B.C., was the rise of Greek philosophy its consequence in the sixth century? Herodotus and Hecataeus relate incidents, which modern archeology has confirmed and expanded, that to some seem to indicate at least an approximation to that conception. The coincidence loses its effect largely when we consider that these authors really began the written history of the modern world. In Herodotus and in the few fragments from other earlier historians we read much of the contact of the people of the Orient and the Greeks. Such records and such traditions do doubtless represent events dating back to the Persian conquests of the Great Cyrus, but we have to depend on another kind of evidence. Ancient papyri, it is true, have been preserved to us which date a thousand years and more beyond that period, but the difficulty in translating the text has only been one of the difficulties we find in ascertaining their meaning and correlation of information thus received, often incoherent in its parts, has not been satisfactorily attained even with the help modern archeology has given us. But from the days of Herodotus we get a fairly coherent story reaching to our own times.

This very coherency and the more or less unbroken continuity in our older historical conceptions have conferred a perhaps exaggerated importance on the first meeting of the Greek men of brass in the Delta of the Nile which Herodotus relates (II. 152). From those literary sources now open to us, even isolated as they are in the gloom of an antiquity which Herodotus has not dispelled, we get enough to convince us of the activity in the intercourse between the shores and islands of the Mediterranean and the oriental hinterlands. The Persian, the Egyptian, the Assyrian surges of political power which swept, at least in their influence on the types of civilization, across the Ægean to its islands and the headlands of Europe, we may well believe lighted foci of culture which were not extinguished when the brown people surged back again, but we can no longer avoid the conviction that throughout this vast

period the general underlying culture of the whole Mediterranean basin, extended far inland on the continents of Asia and Africa, was more homogeneous than certain schools of historians were once wont to admit. This general principle, at which we have arrived, has to be kept in view when we study the vexed question of the intrusion of the northern nations. I may seek the excuse for avoiding the conclusions at which German pre-historians have arrived, on the plea that no evidence credited to them is liable to be received with favor at a time when there is still felt the heat of battle which has overwhelmed their countrymen and the German historians themselves, to whom the major blame has been attached for the prevalence of that imperial spirit which has brought such unexampled woe upon this world of ours. The facts elicited can not be ignored but they are very far from being all attributable to Teutonic research. The deductions from them we have no reason to treat with the same respect.

Although Ridgeway¹ leans upon many facts brought to light by German archeology and is quite evidently influenced to some extent by its conclusions, although he has never written the second volume of his "Early Age of Greece," it is said because the first volume published nearly twenty years ago would have to be rewritten, we may regard as correct the view he entertained at that time that new blood has been always coming into the Mediterranean basin from the North, trickling down through the Balkan gorges it is true, but coming in larger streams from the Black Sea region. Upon this latter route we need only fix for a moment our attention with the thought that both a priori assumption and such historical and archeological evidence as we have points to the probability, if not the certainty, that at certain periods, from causes by no means clear, this steady trickling penetration has been supplemented by repeated invasions of large bodies of red-haired and blue-eyed men which, for a few generations, over varying extents of the Mediterranean area, have submerged if not exterminated the brown-skinned races. These we call indigenous because back of their time we know only the men of the caverns and the Ice Age. Such a preponderating northern blood may have existed in many parts of the Ægean area at the time of the Trojan war. Its existence may not have been unconnected with that migratory mass which, we have come to believe, at a period earlier than that swept through the foothills and mountain passes of the Himalayas into India. The only remark that remains to be made as to the deductions drawn from the indica-

¹ Ridgeway, William, "The Early Age of Greece," Vol. 1, Cambridge University Press, 1901.

tions of these ancient currents of migration is that they have ignored not only the difference between biological and social heredity, but the difference between that part of biological heredity which tells for the persistence of the physical characters of a race and that part which exhibits its mental and moral characteristics. Blue eyes and red hair and skull configurations and stature may indeed die out under the change of environment from the Danube to the Ganges, but until we have better reasons for thinking the contrary, we may refuse to think that necessarily means the death of those invisible and imponderable psychological traits of race which influenced the later course of Greek civilization.

It is not necessary for our purposes to expand these considerations as to the more or less doubtful conclusions, at which history and archeology have arrived in our days, of the relation of the earliest Greeks to neighboring peoples. The only essential thing to keep in mind is the extreme probability that, however much more forcible the impact of the Persian empire upon the Greeks was than the oriental influence which had existed before or after the time of Cyrus and his immediate successors, there were further back than history reaches constantly open channels of commerce and of thought along which ideas may have travelled between east and west. Many years ago a facile Italian writer, De Amicis I think, declared that at Constantinople over the bridge across the Golden Horn ten thousand people crossed daily, but an idea only once in ten years. To Mr. Kipling we owe the despairing apothegm, East is East and West is West; without a better bridge for ideas between them the future is dark indeed for what Mark Twain called "the damned human race." Despite the fact that De Amicis was thinking, in the complacent way we Westerners of recent centuries are accustomed to fall into, of the flow of ideas towards rather than from the rising sun, we must give this train of thought the weight, in a discussion of our own topic, that is its due.

Now occidentalism may not mix well when poured into orientalism, but we need not be too sure that orientalism can not be any more readily poured into occidentalism. Pharmacology teaches us that liquids in manipulation act that way sometimes. To be conscious that Christian cults, animated by all that Western energy and presumptuous vanity can put behind them, do not hold their own even with Mohammedanism, when the missionaries withhold their Christmas sugar plums, is a way of realizing the truth of this admixture process. It still reminds us of the old doctrine that culture has always

traveled with the sun, that orientalism is constantly infiltrating the boasted civilizations of the West. This view does not lend itself very easily to scientific analysis, because it is one which involves so many imponderables. At any rate this rather vague feeling out of the evidence will serve to remind us that perhaps the so-called Aryans did not carry with them a current of Kultur into the heart of the East but doubtless, as has always been their habit, left a trail of blood where they passed, as of late with the Bible in their hands.

As I understand it archeological and philological research has demolished the view that the Susrutas are the origin of some passages of the Hippocratic books. Certainly no one on making the comparison can fail to see that one is surely the source of the other. Native Hindu scholarship vigorously insists on the priority of the culture beyond the Hindu Kush, and Hoernle² is not by any means entirely convinced to the contrary in a general way, but fails to lend any sympathetic support to the antiquated view that Hippocrates got much of his doctrine from the Ayur Veda of Susruta. We are inclined to flatter ourselves with the belief that the physicians in the train of Alexander carried Hippocrates to "Susruta." This may well be so and still we can not dispel the strong impression that the roots of Greek Nature Philosophy were deep in oriental soil and irrigated by oriental thought. For the present we may however safely lay the flattering unction to our souls, unmistakable as this seems to be, that their chief efflorescence began in an atmosphere of civilization created by the Greeks of the Golden Age.

There are one or two considerations still to be taken into account, in a study of the antecedent cosmic relationship of the rise of the Greek nature philosophy, to which I have not alluded. One has to do with Space and one with Time. One is a geographical consideration and the other a chronological one. It has been pointed out that if you follow the space from the 30th to the 36th parallels of north latitude round a globe representing the earth you will find in a belt measuring north and south some 350 miles the deltas of the Nile (32°), the Euphrates (36°), the Yangtse Kian (30°) and the Mississippi (30°). In prehistoric times there arose mighty civilizations on the alluvial deposits of these rivers, the wash of the continents of Africa, of both sides of Asia separated by the dividing lofty peaks of the Himilayas, and of America. There animal life was easily maintained and sheltered by various configurations of land and

² Hoernle, A. F. Rudolf, "Studies in Ancient Indian Medicine," *Journal of the Royal Asiatic Soc. of Great Britain and Ireland*, 1906, p. 915; "Studies in the Medicine of Ancient India, Pt. 1, Osteology or the Bones of the Human Body," Oxford, Clarendon Press, 1907.

water. The richness of those alluvial deposits, extending far up the valleys of the rivers, nourished the beginnings of the human race. In the perimeter of the influence of these conditions cultures flourished, which in the course of many thousands of years have been pushed far beyond this favored strip around the earth. Miletus, Cos, Colophon and the Ægean Islands, on or close to the shores of Asia Minor at the debouchments of the Asiatic caravan routes and in the shelter of ports suitable for the commerce of antiquity, are the spots where arose and from which was dispersed throughout the Greek world the science of the nature philosophers.

As to time, if we use as beacon lights of the infancy of science, not yet divorced from religion, the names of Zoroaster (660 B.C.), Confucius (550 B.C.), Buddha (560 B.C.), Thales (640 B.C.), Pythagoras (582 B.C.) (and whom could we better choose to show us when the human mind first began to work coherently?) the first thing that strikes us is the comparative simultaneity with which they flare up in the abyss of time from the Hoangho to the Cyclades. What does it mean? The first persistence of written records, perhaps? Take a map and you will find these men dwelt on the 35th degree of north latitude strung along a stretch of 100° of longitude. We get a glimmer of intelligence, it is true, of cosmic law; it is not exclusively one of geophysics, but a far more mysterious one of psychomental evolution, curiously affiliated with the measurement of time. To say that this phenomenon is due to the fact that there was a simultaneity in the preservation of the records of the thoughts of these men would be as mysterious as to attribute it to the simultaneity of the birth of modern mental processes itself. We need to concern ourselves further with geo-physical processes, but it concerns us to realize that the evolution of thought is also one of cosmic evolution. It has had its marvelous sequences and we know the Ionian philosophy must have had its antecedents, mysterious as they appear to us.

It was not alone along the mouths of the Euphrates and the Nile the water receded and discovered beneath it to the gaze of the philosopher the soil to which it apparently had given birth. The steaming vapor arose elsewhere into the air and elsewhere air seemed to have its birth from water. When the water fell from heaven on the Mesopotamian plains or spread from the rising Nile over its banks it gave birth to life itself, still a marvel to men from less favored regions who see it for the first time springing in the magic of the elements from fruitful prairies. So we find Thales saying water is the primeval element of the universe from which all things else spring, not the living vegetation alone and the animal life that feeds on it, but

the soil too. We can not yet fathom the chronological mystery, but we see the basis of the nature philosophy in geophysics at least. There is every evidence in the most ancient epics that Thales did not first formulate a theory, so supported by the induction from fact, for ages open to the observations of all delta dwellers. Water was worshipped in Babylon. It is not difficult to find this also in the Zend Avesta, perhaps contemporaneous with the life of Thales and in the Rig Veda vastly older than the Ionian philosophy. Some time some editor will allow me to collate that evidence, but there is no space for it here.

Diogenes Laertius³ is not only a later but a less capable authority than Aristotle in the discussion of the philosophy of the Nature philosophers, but there is a passage to be found in his *Lives and Opinions of Ancient Philosophers* which serves our purpose better.⁴ After referring (VI.) to the fact that the Chaldeans study astronomy and the soothsaying of the Magi and "deliver accounts of the existence and generation of the gods saying that they are fire and earth and water" and after referring to their belief in omnipresent phantoms in the air, he credits Thales with having discovered and invented about all things then known. Besides "he asserted water to be the principle of all things and that the world had life and was full of dæmons." We get at once in the old philosophers the pantheistic belief of primitive man from a record in an age when it was no longer the exclusive point of view, but we get something else, the affiliation of Thales with the lore of Babylon and the orient, despite the fact that Hermippus is quoted as referring to Thales rather than to Socrates the thanks he gave to Heaven that he was a Greek and not a barbarian. Thales too dabbled in the astronomy and astrology of the Magi and is credited with predicting an eclipse, which Murray⁵ ventures to credit with the date May 28, 585 B.C. Some said he was a Jew, which is

³ Diogenes Laertius, "Lives and Opinions of Ancient Philosophers," tr. by C. D. Yonge, London. Bohn, 1853.

⁴ I do not wish to clutter up this essay with references and discussions aside from the pursuit of the end I have in view, the relation of the doctrines of the nature philosophers to those of Hippocratic medicine, but I can not forbear alluding to the now ignored Bayle (*Dictionnaire Historique et Critique*, Amsterdam and Leyden, 1730) who has given by far the best summary of the ideas which in antiquity clustered around the traditions and the philosophy of Thales, if read in an intelligent way. It gives an aperçu far enough removed from our day to be divorced from many of the ideas which environ us and to allow us an insight not to be gained from much more recent historians of Greek thought.

⁵ Murray, Gilbert, "Rise of the Greek Epic," 2d ed., Oxford, Clarendon Press, 1911.

doubted,⁶ others that he was a Phœnician, but Windelband,⁷ accepting the evidence advanced by Zeller, declares he was of a Greek family which had migrated from Bœotia to Asia Minor. However that may be, we find it is said he accompanied Xerxes's army in the capacity of an engineer and he measured the height of pyramids in Egypt by their shadows on the sand.

Much of this may be idle tales, but they are old ones at any rate and rested doubtless on a basis of knowledge of his intimate association with the Persian conquerors of the world. The answer, then, as to the reality of Persian influence made by the student of history to whom I alluded at the start must be in the affirmative, but that oriental influence on the philosophy and science of the Greeks began with Cyrus's short-lived though mighty empire can not for the moment be entertained. The Medes and Persians were upstart mountain peoples who swept down on Nineveh and Babylon and their hoary civilization. The empire of the King of Kings stretched from far beyond the Indus to the rushing tide of the Hellespont, and we can scarcely forbear the belief that many an idea, during a generation or two at least, must have crossed the Golden Horn, going west, 2,500 years before De Amicis wrote his book on Constantinople. Routes of travel became secure and so smooth messengers passed over them at fabulous speed. Relays of horses and inns for horse and man bound distant provinces together. Still, great empires had flourished for thousands of years in Mesopotamia and Cyrus built his on the ruins of Nineveh and Babylon and we find Thales in contact with Babylonian ideas and, if not looking upon water with the reverence of the Magi, regarding it from the standpoint of philosophy as the elementary body of the world, but we may be sure Greece knew of Babylon before the rise of the Persian power. Anaximander, who seems to be the first Darwinian on record was the contemporary of Thales, having supposedly been born after him and to have died before him, need not detain us except to take note that in his advocacy of mutational ideas he seems to have antedated Heraclitus by a few years, but the latter in his obscure and striking phrases impressed it more emphatically on subsequent philosophical thought.

We must therefore lay this aside for a moment and seek the origin of the thought of Anaximenes in accepting the air as the primordial element. This is rather difficult. Indeed it is not at all clear how the air came to be regarded as a materialistic con-

⁶ Burnet, John, "Early Greek Philosophy," 2d ed., London, Black, 1908.

⁷ Windelband, W., "History of Ancient Philosophy," tr. by H. E. Cushman, 2d ed., New York, Scribners, 1906.

ception before the time of Empedocles, unless some demonstration of an objective nature was familiar to men before the latter referred to his klepsydra experiment, but after all that is a mere landmark for us and is of no significance beyond a suggestion of a state of knowledge which may have been long in existence. Thales, Anaximander, Anaximenes were all Milesians and contemporaries, the latter being regarded as the younger. For anything we know of their lives there is nothing to contradict the assumption that they were acquainted with one another and their doctrines like their lives must have been contemporaneous in a relatively small area inhabited by the Asiatic Greeks. They must have lived in approximately the same atmosphere of thought, subjected to the same cosmic influences, yet we find Thales looking upon the water as the elementary unit and Anaximenes, disagreeing with the mutational ideas of his elder, Anaximander, differing from the authority of the still older Thales by the prominence he gave to air in the part it played in the universe. We can find no clue to this except in the supposition that the air in the thought of Anaximenes was the rationalistic inheritance received from the primitive thought of the soul. While the invention of the word *pneuma* is ascribed to Herodotus we may look at the doctrines of Anaximenes as introducing into science concepts received from ideas of men who had long since identified the soul of man with it. I can not think that the vapor of Thales's water ascending above the steaming mud flats of the marshes and vanishing into the atmosphere could have put that vigor into the belief in the potency of air which we recognize in the theory of the *pneuma* as found in ancient medicine. The water, the moisture in its influence on vegetation, was an ever-recurring incentive to the subsequent doctrine of the humoral theories but we must find support in the primitive ideas of the soul for that stimulus which we equally recognize in the doctrine of the *pneuma*. In a number of essays⁸ I have developed this affiliation and I need only allude to it here. I take however this occasion to remark, as a preliminary to a like development of the history of humoral ideas, that they owe their expansion and the vigor with which they flourished not alone to the philosophical ideas of Thales in regard to water, but quite as much to the magical form they took in Babylon, which always lends itself so readily to the propaganda of belief.

Trivial and absurd as some of the statements attributed to Anaximenes we see in the form of the statement of his philos-

⁸ "The Soul and the Breath," *New York Medical Journal*, July 20, 1918; "The Blight of Theory on the Acquisition of Anatomical Knowledge by the Ancient Egyptians," *Ibid.*, Dec. 7, 1918.

ophy which has come down to us⁹ something significant to us in the opening phrase of a discourse on the air. "When it is very attenuated fire arises . . . a sort of rarefaction of the air." Now we have no explicit data as to his birth and death, but as has been said, he seems to have had personal converse with Thales and Anaximander, who both died probably within ten years of 550 B.C. All of these, we remember, were born at Miletus, which had commerce on every trade route of the Near East and had sent out colonies along many of them. It was not destroyed by the Persians until about 500 B.C. The birth of Heraclitus at Ephesus is sometimes fixed at 535 B.C. As Anaximenes, like so many of these old men of science whose lives had to be stretched out to conform with traditions of various events widely separated in time, was supposed to have been then alive, his ideas at least must have been familiar to Heraclitus, for it is said Anaximenes was an instructor of Anaxagoras in 480 B.C. At any rate when Heraclitus had arrived at maturity doubtless the doctrines of the elder man were well developed, with their implication of fire as springing from the air, which differed under the influence of its environment in rarity and density. Back of this physical conception of fire and heat in its rationalistic affiliation with the air lay the impetus of Zoroastrian magic or religion. Thus it seems more than possible that the views not only of Thales and Anaximander and Anaximenes but those also of Heraclitus and Parmenides had not only much in common but a common basis in magic. It seems to me then that the idea which Lewes,¹⁰ among the first of the modern historians of the Greek nature philosophers, had, that there was some metaphysical doctrine behind them which held them together, was fully justified. No fact or speculation is saved from oblivion unless it falls on ground which has been prepared for its germination into a larger life.

The views of Heraclitus too doubtless found a more ready acquiescence, because his sayings were mystical and obscure to such an extent that a thousand years later he even secured the approbation of Clement of Alexandria in not trusting alone to observation and experiment. He quotes him as saying that "eyes and ears are bad witnesses for men, since their souls lack understanding." His further cryptic saying resembles that of Anaximenes so much we may doubt if tradition has not confused the two. Heraclitus is quoted⁹ as saying "the transformation of fire are first of all, sea; and of the sea one half is

⁹ Bakewell, Charles M., "Source book in Ancient Philosophy," New York, Scribners, 1909.

¹⁰ Lewes, G. H., "Biographical History of Philosophy," 2 vols., Appleton, New York, 1857.

earth, and the other half is lightning flash. All things are exchanged for fire and fire for all things, as wares are exchanged for gold and gold for wares." We are warned by Burnet⁶ not to put too much trust in these reports derived from Sextus Empiricus and indeed we find Anaximenes quoted, as above, saying fire is but attenuated air which when it is condensed is "wind, then cloud, then when more condensed water, earth, stones. . . . All things are generated by a sort of rarefaction and condensation of air." The latter saying explains to us more fully the development Diogenes Apollonius gave at Athens to the air. We have Diogenes Laertius³ for authority that he was the pupil of Anaximenes and was once at Athens. At any rate whatever may have been the exact date of the life of Diogenes Apollonius we arrive at the time or near the time of Hippocrates and we can perceive the atmosphere into which he was born. We can better understand the caution he exhibited and even the hostility, akin to disgust, which he exhibited in the Book "On Ancient Medicine" when he repelled the theories of the Nature Philosophers. Socrates, some years his elder, in his way joked about it. Diogenes Laertius relates that Euripides once gave Socrates a "small work of Heraclitus to read, and asked him afterwards what he thought of it, and he replied: 'What I have understood is good; and so I think what I have not understood is; only the book requires a Delian diver to get at the meaning of it.'" I am sure some of us would agree that Heraclitus was not only "the obscure," but the obfuscated, and thus earned the sympathetic notice of Clement.

With this exposition of the cosmic analysis of Thales, Anaximander, Anaximenes and Heraclitus we have of course by no means exhausted all that could be said of their mental activities nor have we quite exhausted all that is desirable to say of the sources accessible to us from which Hippocrates might have drawn his ideas. Socrates, we see from another account, was interested though not much enlightened by what Heraclitus had to say, but Plato's works bear indubitable evidence of the influence upon the author of the theories commonly attributed to Heraclitus. Between the Master whom his pupil made immortal, between Socrates and Plato in age stood Hippocrates, more concerned than either of them with the river of life which the physician never finds the same.

Xenophanes, born 570 B.C. at Colophon, said to have been a disciple of Anaximander, was driven by the Persian War, which destroyed Miletus and so many of the other Greek cities of Asia Minor, from his home and made a beggar, a peripatetic impecunious scold, always ready for a jibe and a jest, and interested in the earth as the primary element of all things. Some

one told him that eels lived in hot mud. "Ah well," he said, "we will boil them in *cold* water." To him science owes that healthy skepticism which refuses belief of even the obvious. He was said¹¹ to be the friend of Hippocrates, though I can not reconcile that to his having been the pupil of Anaximander, nor with his having been born in 570 B.C. when Hippocrates was born in 460 B.C. He is even credited with having written the Hippocratic treatise "On Ancient Medicine," which is better chronologically. We can conjecture that Hippocrates owed to him the caution with which he looked upon theories exhibited in other books, usually those regarded as "genuine," whose spirit of reserve is in such contrast to that of "The Winds," sometimes said to have been written by Diogenes Apollonius, when the air is the cause of everything. Xenophanes at least supplies us with the complement of the four elements of the unitarian philosophers. "All things come from earth and all things end by becoming earth. For we are all sprung from earth and water."

Thus far I have only outlined those matters of interest which are in line with subsequent thought in Hippocratic Medicine, leaving aside other matters scarcely less essential in a study of the broader aspects of philosophy. To this world of Nature Philosophy Empedocles is closely allied despite his intimate connection with the history of Hippocratic Medicine for we are already in the age of Hippocrates when we reach Empedocles, who is supposed in one chronology to have been but ten years older than the Father of Medicine. The theory of the special senses developed by Alcmaeon and Empedocles, is dependent on atomic doctrine for its very existence, yet they were certainly both of them older than Democritus with whose name atoms are usually associated. The physiology of the senses plays but very little part in the literature of the Hippocratic Corpus. The special treatise of Theophrastus¹² on the Senses, and the historical account of Beare¹³ in modern times are so condensed that an account of the matter extracted from them could be further compressed only at the expense of the elimination of much detail in which much if not most of the interest resides. It is quite out of the question to attempt such an exposition here but at any rate from what has preceded we are in a better position to measure the originality of Empedocles in his

¹¹ Gomperz, Theodor, "Greek Thinkers," tr. by Laurie Magnus. New York, Scribners, 4 vols., 1908-1912.

¹² "Theophrastus and the Greek Physiological Psychology Before Aristotle," tr. by George Malcolm Stratton, London, Allen & Umvine (?), 1917.

¹³ Beare, John I., "Greek Theories of Elementary Cognition from Alcmaeon to Aristotle." Oxford, Clarendon Press, 1906.

relation to other implications of Nature Philosophy. It was not in inventing another unit for a sole element. It was in further development of the theories plainly antedating his own life span. It was in the greater precision of the combination of the elementary constituents of all things, earth, air, fire and water. Of his predecessors Alcmaeon, the Pythagorean, is supposed to have been his master as Leucippus was thought to have been the teacher of Democritus, a coeval of Hippocrates (b. 460 B.C.). In the sense however that these men taught their pupils anything new they were not their masters,—the ideas which had their birth in ages long past were apparently only carried to their logical or illogical conclusions by Empedocles and Democritus.

The views of Alcmaeon, much less those of Empedocles, especially as to the senses, could not have been entertained for a moment without the appreciation of the minute divisibility of matter. We can even suspect this conception was the chief advance of the human mind which sapped the foundations of primitive man's belief in the dæmonic etiology of disease. Whatever weight this thought is entitled to, we can easily realize that a mighty obstacle to the advance of ethics was rolled from his path when man came to realize he could not escape from evil by transferring evil to some one else. Primitive and even much later man often acted on the assumption that if he passed on his disease to another he must necessarily thereby get rid of the devil that was gnawing at his own vitals. Bacteriology has got rid of that difficulty by inheriting from Leucippus or his unknown forerunners the doctrine of the minute divisibility of disease devils in the body. What is the good of passing on this sort of spawn to another? Plenty more must be left behind. The minute divisibility of matter had more to do with the doctrines of Alcmaeon and Empedocles and even more to do with modern bacteriology than they had to do with the physiology of the Hippocratic books, yet in the doctrines of the pores, a necessary corollary of atomic apperception of sense objects, we find ample reason for alluding to Leucippus and Democritus in the history of Hippocratic, Platonic and later physiology and therapy.

Pythagoras lies a little apart from our interest, not only because his strange preoccupation with numbers did not have much influence upon subsequent medical history in the time of Hippocrates, but I am personally quite unable to understand either the strength of his propaganda in antiquity or the phenomenon of its origin. We can as a rule run down or rather ascend the currents of thought to their sources in the emotions or the comprehensible aberrations of reason of primitive man,

but, though the invention of numbers had its magical affiliations, this was very long indeed before Pythagoras brought back to Crotona the doctrinal teachings of the orient and very long after men on the sea coasts were accustomed to figures and to figure. The mystery which surrounded magnetic iron, or radium or any other new thing is sure to attract an eager crowd of the credulous longing to be astounded, and of those eager to do the astounding, but this sort of mushroom cult produces no such extended and long persisting attention as the doctrine of numbers spread by the Pythagorean sect to Plato and through Plato to the Neo-Platonists and to mediæval thought. Pythagoras however was the teacher of Alcmaeon and though the latter is said⁷ to have stood aloof from the number theory, he doubtless had from the chief of his sect the idea, subsequently and to this day pervading all medicine, that health is an equilibrium of forces, an idea in consonance with that of harmony as a general principle which rules cosmic affairs. How far Alcmaeon anticipated Empedocles in rejecting unitarian ideas of the elemental constitution of matter and its inevitable influence on the unitarian conception of the etiology of disease, we may perceive, if we accept the fragment¹⁴ attributed to him. "The preservation of health is the equipoise of forces, of the wet, dry, cold, warm, bitter, sweet, etc., the predominance of one alone produces disease. The activity of one of the opposing principles works harmfully. Indeed cases of disease, so far as the causes are concerned, are to be traced back to the preponderance of heat or cold, dependent upon too much or too little food, affecting the blood, the brain or the marrow; but diseases also arise from external causes, from certain waters or regions, or from fatigue, or famine or the like." This reminds the student of Hippocrates at once not of "Ancient Medicine" alone but of the "Airs, Waters and Places."

We are unable to trace the theory of pores further back than Alcmaeon, but wherever the atomic division of matter, especially in its application to the beginning of physiology of the body of men and animals, first began to engage the thoughts of men, the pores for them to enter must have arisen in the speculations of the human mind. If Leucippus was the teacher of Democritus who was born in 460 B.C., he must have been rather the contemporary than the teacher of Alcmaeon who was the pupil of Pythagoras; teacher of Democritus who was coeval in birth with Hippocrates he could scarcely otherwise have been. In fact we know nothing of the birth or birthplace of Leucippus. According to Aristotle he is removed to a date as early at least as the old age of Pythagoras whose birth is placed about 570 B.C.

¹⁴ Diels, Hermann, "Die Fragmente der Vorsokratiker," Berlin, 1903.

These dates are most of them irreconcilable with so much that is said about the doctrines attributed to the various personages that we are lost in a maze, but we have good reason to doubt that the ideas of pores in and on the surface of the animal body to receive the atoms of Leucippus originated with Alcmaeon. Different sizes and shapes of these, which, of course reminds Gomperz¹¹ of the theory of his countryman Ehrlich, given off from the object seen, heard, smelled, tasted and even felt serve to complete rather than to originate or even elucidate the thought supplied as a basis of the theory of perceptions.¹² It no doubt also opened the way for Empedocles to form later his teachings of respiration and perspiration through the tissues and their external covering. It supplied Plato with the thought of his wonderful scheme of the network of the body. Its affiliation with what histology has revealed to us of the minute structure of the connective tissues is easily demonstrable and is as striking an example of how the generalizing power of theory outruns the knowledge of facts as that of the atomic theory itself. Theory so remote in time as this was forming a soil in which future science could find a suitable place for accepting facts which otherwise would have been lost with myriads of others less fortunate, which have been exposed and perished in the immense stretch of time which has since intervened, for the want of a proper environment.

Having given us the most plausible definition of the etiology of disease, having advanced and expanded a preexisting atomic conception of matter, Alcmaeon, according to the records, was the first to declare and possibly to demonstrate by the dissection of animals that the brain is the sensorial center and the origin of the nerves. I think Burnet⁶ has not sufficient evidence to show that Hippocrates himself, if we accept Littré's classification of the Hippocratic Corpus, grasped this view at all, though Plato¹³ evidently was influenced by it in placing the higher, the rationalistic part of the soul there. This teaching of his elder made no impression on Empedocles and Aristotle totally and specifically repudiated it.¹⁴ Galen established it more firmly, for this fact did not perish, since it is evident in some of the so-called spurious books of the Hippocratic Corpus. We recognize in Alcmaeon, from the little tradition has left us, a mind commensurate with that of Hippocrates himself. It is impossible to take up here the physiology and, in the broader use of the term, the cosmic theories of Empedocles, for I look upon them as indissolubly connected with Hippocratic medicine itself.

¹³ Plato, "Timaeus," 73.

¹⁴ Aristotle, "History of Animals." Lib. II, Cap. 4.